



U.S. Department
of Transportation

**Research and
Special Programs
Administration**

APR 14 2000

400 Seventh Street, S.W.
Washington, D.C. 20590

DOT-E 12098
(SECOND REVISION)

EXPIRATION DATE: March 31, 2001

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Carleton Technologies, Incorporated
Orchard Park, NY
2. PURPOSE AND LIMITATIONS:
 - a. This exemption authorizes the manufacture, marking, sale and use of a limited life, non-DOT specification cylinder conforming with all regulations applicable to a DOT Specification 3HT cylinder, except as specified herein, for the transportation in commerce of the materials authorized by this exemption. This exemption provides no relief from the Hazardous Materials Regulation (HMR) other than as specifically stated herein.
 - b. The safety analyses performed in development of this exemption only considered the hazards and risks associated with transportation in commerce. The safety analyses did not consider the hazards and risks associated with use as a component of another device or other uses not associated with transportation in commerce.
3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.
4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 173.302(a)(1) and 175.3 in that the prescribed non-DOT specification cylinder is not an authorized packaging.
5. BASIS: This exemption is based on the application of Carleton Technologies Inc. dated November 22, 1999 and additional information dated January 31, 2000 submitted in accordance with § 107.105 and the public proceeding thereon.

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6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Hazardous materials description -- proper shipping name	Hazard Class/ Division	Identi- fication Number	Packing Group
Oxygen, compressed	2.2	UN1072	N/A
Rare gases and Oxygen mixtures, compressed	2.2	UN1980	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Packaging prescribed is a non-DOT specification welded sphere that will be transported installed in a rebreather apparatus. The sphere must conform with Carleton Technologies Inc.'s drawing B16313-3 dated, February 28, 2000 on file with the Office of Hazardous Materials Exemptions and Approvals (OHMEA), and must be fabricated in accordance with DOT Specification 3HT cylinder (§§ 178.35 and 178.44) except as follows:

§ 178.35(e) *Safety devices.* The individual sphere is not equipped with a pressure relief device; the rebreather apparatus is equipped with a pressure relief device that limits the pressure in the sphere to 4,375 psig or less.

§ 178.35(f) *Markings.*

(1) * * *

(i) Each cylinder must be marked "DOT-E 12098" in lieu of "DOT-3HT", followed by the service pressure.

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§ 178.44(a) *Type, size, and service pressure.* Welded sphere with a maximum volume of 180 cubic inches and a maximum service pressure of 3,500 psig.

§ 178.44(b) *Authorized steel.* The cylinder must be constructed of Inconel 718 in accordance with UNS N07718.

§ 178.44(e) *Welding.*

(1) Welding of the two spherical halves is authorized. Welding procedures and operation must be qualified in accordance with MIL-STD-2219 and MIL-STD-1595.

(2) All welded joints must be 100% radiographically examined in accordance with MIL-STD-453. Interpretation and acceptance of radiographs shall be in accordance with MIL-STD-1264, Grade II.

(3) All welded joints must be liquid penetrant inspected in accordance with MIL-STD-6866, Type 1, Method A, B, or C. Acceptance of liquid penetrant results shall be in accordance with MIL-STD-1907, Grade A.

§ 178.44(f) *Wall thickness.*

(1) Minimum wall thickness must be such that the wall stress at minimum specified test pressure may not exceed 135,000 psi or 75 percent of the minimum tensile strength of the material as determined from the physical tests prescribed in § 178.44(m).

(2) Calculations must be made by the formula:

$$S = PD/4tE$$

Where:

S = Wall stress in psi;
P = Test pressure prescribed for water jacket test, in psi;
D = Outside diameter in inches;
t = Minimum wall thickness in inches;

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E = 0.85 (provides 85 percent weld efficiency factor which must be applied in the girth weld area and heat zones which zone must extend a distance of 6 times wall thickness from center of weld);

(3) Does not apply.

§ 178.44(g) *Heat treatment.* The completed cylinders must be uniformly and properly heated prior to tests.

§ 178.44(j) *Cycling test.*

(1) * * *

(2) * * *

(3) A "lot" is defined as a group of cylinders fabricated from the same material, manufactured by the same process and heat treated in the same equipment under the same conditions of time, temperature, and atmosphere, and may not exceed a quantity of 200 cylinders.

(4) * * *

§ 178.44(l) *Flattening test.*

(1) One sample ring representative of the cylinder must accompany each lot. The sample ring must be from the same material and be subjected to the same heat treatment as the lot of cylinders.

(2) The sample ring representative of the cylinder must be flattened. The sample ring may not include the heat affected zone or any weld.

(3) Flattening between flat plates is authorized.

(4) If the sample ring cracks when subjected to specified flattening test, the lot of cylinders represented by the test must be rejected (see § 178.44(q)).

§ 178.44(m) *Physical tests.* Physical tests not required.

§ 178.44(n) *Magnetic particle inspection.* Not required. Instead, each cylinder must be inspected using apparatus and procedures for liquid penetrant examination in accordance with ASTM E-165-65. Inspection must be performed externally on the finished cylinder after hydrostatic testing. Evidence of discontinuities, which in the opinion of the independent inspector may appreciably weaken or decrease the durability of the cylinder, must be cause for rejection.

§ 178.44(o) *Leakage test.* Does not apply.

§ 178.44(p) *Acceptable results of tests.*

(1) Flattening: The sample ring may not crack when flattened so that outer surfaces are not more than fifteen times wall thickness apart.

(2) Physical tests: N/A

(3) * * *

(4) * * *

§ 178.44(r) *Marking.*

(1) Cylinders must be marked by low stress type steel stamping or laser engraving in an area and to a depth which will insure that the wall thickness measured from the root to the interior surface is equal to or greater than the minimum prescribed wall thickness. Marking must be permanent and legible. Marking on side wall not authorized.

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b. TESTING: Each cylinder must be requalified in accordance with the requirements for DOT 3HT cylinders as specified in § 173.34(e).

c. OPERATIONAL CONTROLS:

(1) A copy of the inspector's report required by § 178.35(g) for the first lot of cylinders must be submitted to the OHMEA prior to first shipment.

(2) Cylinders must be shipped in strong outside packagings in accordance with § 173.301(k).

(3) Each cylinder is authorized for use under this exemption for no more than 24 years from the date of manufacture. Cylinders must be removed from service at the end of the authorized life.

8. SPECIAL PROVISIONS:

a. In accordance with the provisions of Paragraph (b) of § 173.22a, persons may use the packaging authorized by this exemption for the transportation of the hazardous materials specified in paragraph 6, only in conformance with the terms of this exemption.

b. A person who is not a holder of this exemption, but receives a package covered by this exemption, may reoffer it for transportation provided no modifications or changes are made to the package and it is offered for transportation in conformance with this exemption and the HMR.

c. A current copy of this exemption must be maintained at each facility where the package is offered or reoffered for transportation.

d. Each packaging manufactured under the authority of this exemption must be either (1) marked with the name of the manufacturer and location (city and state) of the facility at which it is manufactured or (2) marked with a registration symbol designated by the Office of Hazardous Materials Exemptions and Approvals for a specific manufacturing facility.

e. A current copy of this exemption must be maintained at each facility where the package is manufactured under this exemption. It must be made available to a DOT representative upon request.

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9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo aircraft only.
10. MODAL REQUIREMENTS: A current copy of this exemption must be carried aboard each aircraft used to transport packages covered by this exemption. The shipper must furnish a copy of this exemption to the air carrier before or at the time the shipment is tendered.
11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:
 - o All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, Parts 171-180.
 - o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this exemption, including display of its number, when this exemption has expired or is otherwise no longer in effect.

12. REPORTING REQUIREMENTS: The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (49 CFR 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must also inform the AAHMS, in writing, as soon as practicable of any incidents involving the package and shipments made under this exemption.

Issued at Washington, D.C.:



Robert A. McGuire
Acting Associate Administrator for
Hazardous Materials Safety

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(DATE)

Address all inquiries to: Associate Administrator for Hazardous
Materials Safety, Research and Special Programs Administration,
Department of Transportation, Washington, D.C. 20590.
Attention: DHM-31.

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